DRIVING YOUR INDUSTRY 4WARD

4.0 NOW – SENSOR INTELLIGENCE IN THE HERE AND NOW

SICK
Sensor Intelligence.

Dear Readers,

the time has arrived: Industry 4.0 is happening now. SICK, with its intelligent sensors, is on the path to a completely networked and autonomous value chain. It is very important to us that we take our customers with us on this journey right from the beginning. We therefore view ourselves as an intermediary between our customers and the sometimes abstractly perceived future. 4.0 NOW is a very tangible thing, however.

By definition, data is the foundation of functioning Industry 4.0 applications. Data is the prerequisite for complete networking of development, production, logistics, customers and partners. Machines, workpieces, shelves, containers and shuttles become intelligent objects that supply data in real time and exchange information. As a result, production and intralogistics are merged into a digital, global unit.

What we at SICK have already been able to implement is currently being showcased in our 4.0 NOW factory in Freiburg. During the Hannover Trade Fair, we presented a livestream of the facility to give our customers a whole new perspective on these developments.

But there's still a lot more to 4.0 NOW than this. We are working on total transparency as well as in the area of artificial intelligence. With the help of our localization app, for example, it is possible to make all productive assets, load carriers, and loading aids a transparent part of the whole value creation process. From material procurement through to delivery of a finished product, this provides the capability for a host of optimizations. The deep learning algorithms in our image analysis and processing software, in turn, make AI applications a reality, thereby enabling complex tasks in production applications to be solved, e.g. the automated detection, checking or classification of objects.

Come join us as we dive ever deeper into the world of Industry 4.0.

Sincerely,

Dr. Robert Bauer
Chairman of the Board of SICK AG

# FIND OUT ALL ABOUT 4.0 NOW HERE

CONTENTS

THE FOURTH INDUSTRIAL REVOLUTION IN FOCUS

Revolutions change the world. The first industrial revolution began with the invention of the steam engine at the end of the 18th Century, and the change from manual production to automated production. The second industrial revolution followed approximately 100 years later with the development of electrically-powered assembly line production which has made cost-effective series production possible since the first third of the 20th Century.

The fourth industrial revolution

FROM THE INVENTION OF THE STEAM ENGINE TO THE INTELLIGENT FACTORY

Mechanical system	Flow production	Automation	Autonomous flexibility
Steam engines	Electric motors	Controller	Digitalization
POWER	SERIES PRODUCTION	MASS PRODUCTION	RESOURCE EFFICIENCY
MECHANICAL SENSORS	ELECTROMECHANICAL SENSORS	ELECTRONIC SENSORS • Quality • Safety	SENSOR INTELLIGENCE • Requirement for autonomous action
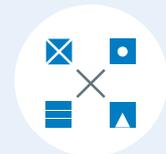
Industry 3.0 and Industry 4.0

SICK is already a part of the third industrial revolution. It began in the 70s and 80s. Electronic control systems, information technology, electronics, robots, and the increased use of sensors made it possible to further automate production, assembly, and logistics processes. The photoelectric sensors from SICK are already an integral part of these changes, and are used around the world and across many industries.

The fourth industrial revolution with its digitization and networking of machines has been changing our lives for some time now. These new technologies have allowed the physical and virtual worlds in production and logistics to merge to form cyber-physical systems (CPS). Since 2011, these developments have been referred to collectively as Industry 4.0. Machines have the ability to communicate with one another autonomously, thereby optimizing process flows. Industry 4.0 clearly relates to networking in the industrial sector. SICK plays a very important role in the value creation chain in this area. The prerequisite for communication is an abundance of information, which is what SICK sensors deliver.

Sensor technology as the foundation of Industry 4.0

Sensor technology is the necessary prerequisite for transparent processes in Industry 4.0. The sensor serves as the foundation for all subsequent applications. Simply put, without sensor technology, there would be no Industry 4.0.

In contrast to conventional, non-networked sensors, Industry 4.0 sensors deliver more than just measurement data. Their integrated decentralized computing power and flexible programmability are important characteristics for making production more flexible, dynamic, and efficient.

To find out more, visit our website:
➔ **www.sick.com/industry40**

Integration into automation networks through networking, new levels of communication, as well as data security – these are the three core areas of focus for SICK in the context of Industry 4.0.

NETWORKING AND DIGITIZATION

The nature of communication is changing. In transparent production processes, machines and sensors communicate both with one another as well as directly over the Ethernet or in the cloud, thereby transforming a closed system into an open one. But not only the quantity of the information processed in-situ is changing. The quality is being raised to a whole new level as well. Information about the status of the production equipment, and associated predictions of the likelihood of production downtimes with the aid of innovative feedback systems, are but one example. All of this has been made possible by the rapid increase in computing power, which can be employed remotely at the so-called edge of the network or the production base. This results in a more flexible and dynamic production that can respond individually and quickly to customer requirements at any time.

Company level

Production level

Process control level

Machine control level

Field devices

Ethernet

SPS

Fieldbus

Sensor

Communication levels in present-day factories

The until recently commonly used mode of communication from sensors to control units, and the superordinate distributed control, production and company levels is a closed system. In such a system, data is communicated by field devices, i.e. sensors and actuators, to the programmable logic controller (PLC).

Networked information

The cloud will play an increasingly important role in managing the overall process in future. The actual primary computing power, however, is increasingly being relocated to the edge. Sensors convert the collected data into information, which is then processed via the Ethernet or in the cloud for the downstream process.

Cloud computing

Edge computing

Direct connection

SIM

Middleware
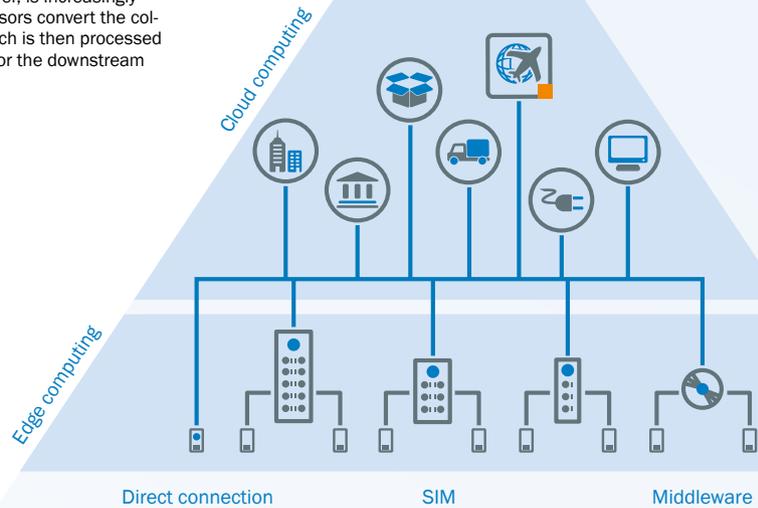
Communication levels in the era of Industry 4.0

In future, decentralized computing power will convert data into information directly within the sensor. Decisions are made in a decentralized manner. Process, production, and company-related information are transmitted directly via the Ethernet or to the cloud.

Ethernet

SPS

Fieldbus

Sensor

4 INDUSTRY 4.0 READY
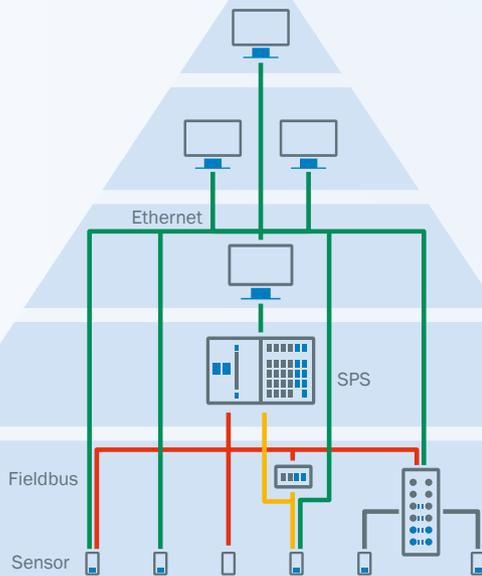
TURNING DATA INTO INFORMATION

Sensors are the first point of contact with as well as the connecting link to Industry 4.0. Whereas the aim in the past was to simply collect data and make simple decisions, today's sensor intelligence also enables data to be prepared and further processed into information. Sensors therefore no longer just "sense". With the beginnings of digitization they are also starting to "think". From this point onwards, the transmission of the produced information becomes a key technology. The success of networked value creation chains is heavily dependent on the successful integration of sensors in the overall architecture of an application.

To reliability communicate with the network, it is essential that the required data is clearly defined and integrated into the networked data world. Selecting the right type of communication protocol for a defined path plays an important part in this. Although Ethernet-based solutions are most common, IO-Link can also be used to establish network connections, particularly on devices that only require limited communication abilities.

In a smart production environment, many different sensors collect a high volume of data at many different locations, thereby increasing the importance of decentralized data processing. Additional interfaces to the data or software system enable new analyses and functions to be performed, which increases flexibility, quality, efficiency, and transparency in production.

Once the crucial issues regarding data security have finally been resolved, the cloud will play an ever increasingly important role in the near future. In the future, it will be possible to send sensor data directly to the cloud via application-specific connection technology – while bypassing the control system altogether.

The successful and comprehensive networking of all sensors to centralized or decentralized data processing systems opens up an unprecedented number of solutions. And an unparalleled quality of transparency is achieved throughout the entire process on account of the data and communication protocols used.

In a smart production environment, sensors collect data and immediately process them further. The information collected in this manner is then communicated either via the Ethernet or directly into the cloud. Knowledge without detours.

Complete networking of all data within a secure environment

Deeper and deeper into Industry 4.0 with deep learning

Deep learning provides a means of improving sensor functionality through self-learning algorithms. It enables the sensor to not only deliver data but to also learn to process information and thereby acquire new functionality. Adaptive sensors make new processes possible. Integrating deep learning algorithms into the image analysis and processing software enables complex tasks in production applications to be solved, e.g. the automated detection, checking or classification of objects. In one of these solutions, for example, sensors are trained with the help of a large number of images to give an answer to a specific question. As a result of this training, the sensor then has the ability to independently classify new unknown images.

The special feature of the SICK solution: artificial intelligence calculates the new solution in the cloud, and the new algorithms generated from this are made available locally on the sensor. The cloud is therefore used for complex deep learning operations, while the algorithms are provided directly within the camera in a fail-safe manner.

OPTIMIZED VALUE CREATION THROUGH TOTAL NETWORKING

A connected factory is a prerequisite for Industry 4.0. Every sensor, every machine, and every human involved can communicate with and among one another at any time. This information exchange doesn't end at the factory gates, however. The interplay of edge and cloud also allows production and data management from and to the outside. This intensive cooperation between technology and humans makes the process more transparent, productive and profitable.
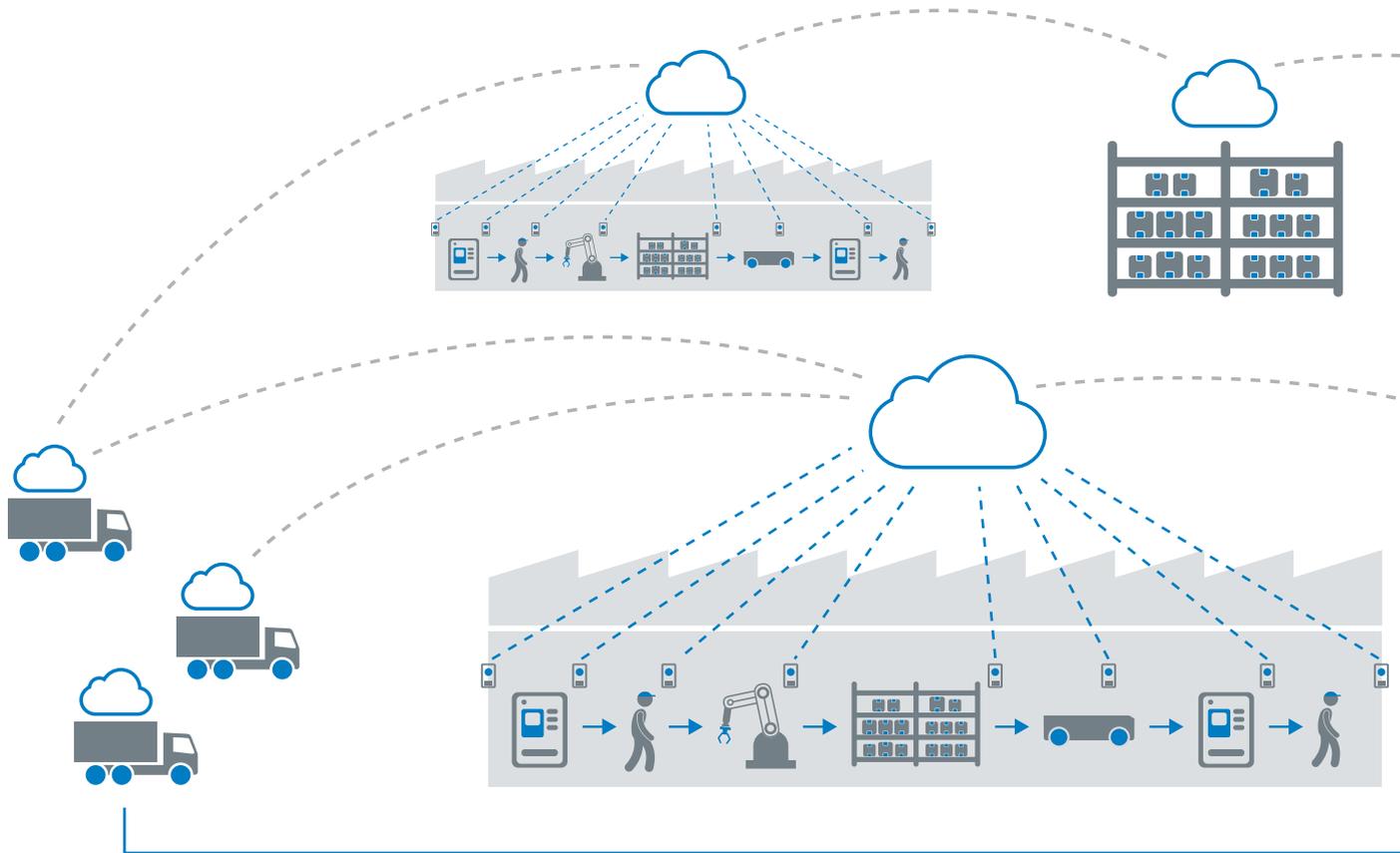
Very high efficiency in the overall process

1. Transparent value creation

Always knowing what is happening when, where, and how. This transparency enables the entire production or supply process from A to Z to be tracked and influenced in real time. This gives the user constant visibility of both the machine availability and the product.

2. Dynamic and flexible production

The progressive automation of production supports flexibility and very small batch sizes. Customer needs become the focus, and one-off production can finally be profitably implemented as well.

3. Automation of quality assurance

Improvements in computing power are also changing the visual capabilities of image-based solutions for quality assurance and sensor-supported production management. SICK sensors are keeping the quality of products always in sight.

4. Mobile platforms

Mobile systems are increasingly being integrated into the production chain. Automated guided vehicles from small to large are providing assistance, safely and without accidents, in almost every industrial environment.

5. Human-machine collaboration

True collaboration means more than just cooperation and coexistence. Humans and machines are engaging on an equal footing, and working hand in hand within the same workspace.
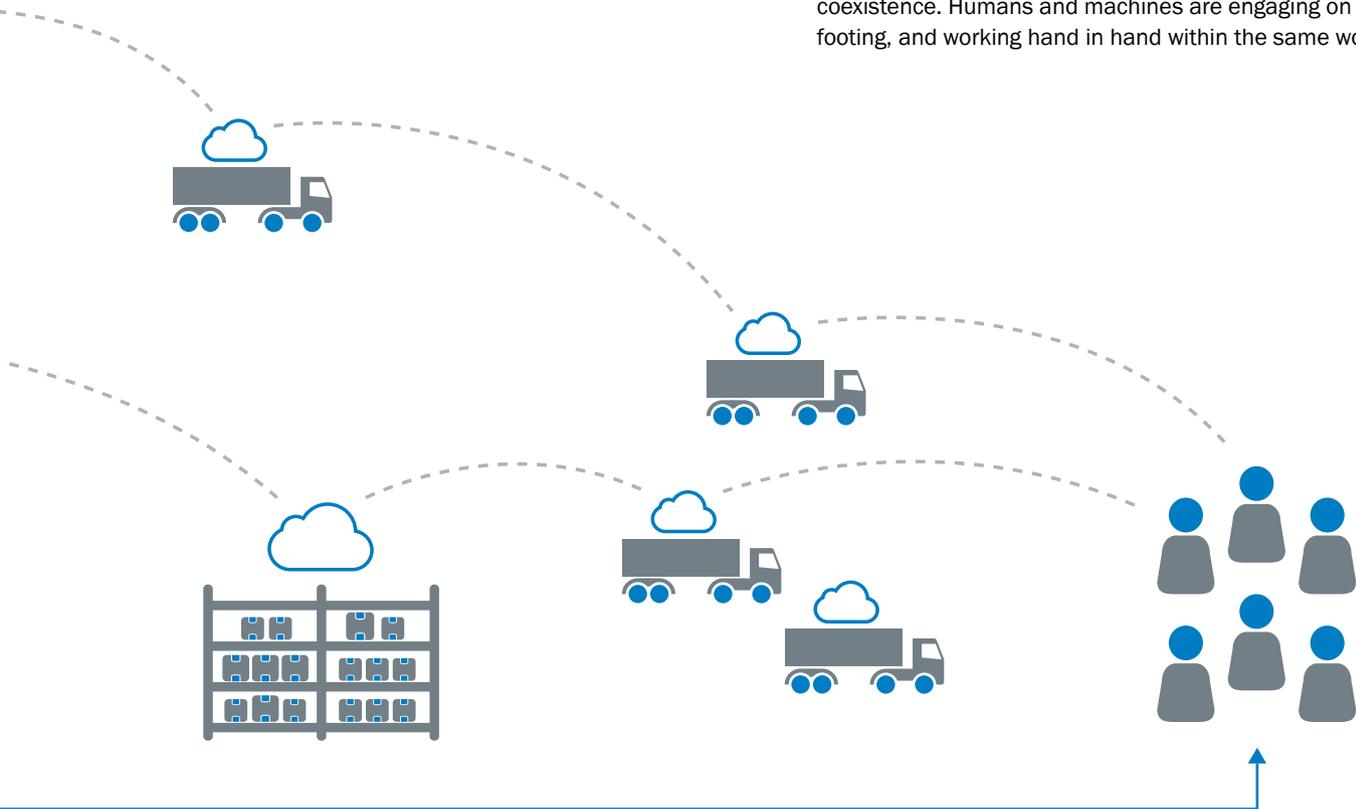
TRANSPARENT VALUE CREATION

The positive impact of Industry 4.0 networking on the overall production process is identified as consistent and transparent value creation. When the networking is successful, this type of transparent value creation provides an overview of all production and logistics processes along the entire supply chain, right through to order fulfillment and delivery to the customer. This reduces material and resource consumption.
And optimizes the production and delivery networks as a whole. Intelligent track and trace solutions generate data and information that enable seamless detection, identification, and traceability of products and materials in the networked process chain.

Seamlessly networked: Every product firmly in sight

Track and trace solutions can be implemented using a wide range of different technologies. When it comes to achieving the best possible reading performance and system integration, the choice of identification technology varies depending on the respective requirements. In a connected factory, RFID and programmable cameras are the most popular choice as Industry 4.0-compatible solutions. The sensor technology along the production chain uses the data cards to directly detect which assembly steps are to be initiated, thereby ensuring comprehensive transparency right through to delivery.

Transparency for every process

Today's intelligent sensor solutions are not just about recording reality accurately, but also about processing the information in the sensor. For example, thanks to a flexible output format, the data output can be adjusted exactly to suit requirements by setting and linking the logical conditions. In light of all this, each technology will continue to have its place in the future: RFID, for example, makes it possible to read and write data and therefore reuse the data cards; it also does not require direct "visual contact". Image-based code readers, on the other hand, are able to read 2D codes and plain text. Any stored images can be archived and analyzed.

A complete overview of every production and logistics step – this is the declared goal of transparent value creation and our promise to you. Thanks to a wide variety of technical solutions and innovations such as the localization app, it is now possible to visualize all products and machines.

UNDERBODY
Target: 380
Actual: 376
Downtime: 8 min

SIDE PANELS
Target: 402
Actual: 401
Downtime: 0 min

ROOF
Target: 410
Actual: 398
Downtime: 10 min

DOORS
Target: 370
Actual: 373
Downtime: 0 min

FRAMING
Target: 414
Actual: 399
Downtime: 9 min

FINISH
Target: 390
Actual: 382
Downtime: 5 min

Transparency for every process

RFU63x – at a glance

- SICK AppSpace ready
- Industry-standard UHF RFID writing/ reading unit
- With or without integrated antenna depending on type (up to four antennas can be connected)
- Standards-compatible transponder interface (ISO/IEC 18000-6C/ EPC G2C1)
- Supports industry-standard data interfaces and fieldbuses
- MicroSD memory card can be used for parameter cloning
- Extensive diagnostic and service functions
- Radio frequency permit for all key industrial countries (see Quickstart)

Your benefits

- Can also be used as a stand-alone system thanks to intelligent process logic
- Optimum and stable reading performance
- Can be easily integrated into industrial networks thanks to 4Dpro compatibility
- Easy to replace thanks to the cloning back-up system on the MicroSD card
- Easy to configure for application-specific requirements using the SOPAS interface
- Simplified diagnostics thanks to the LED signal on the device which can be freely assigned

➜ www.sick.com/RFU63x

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

Lector63x – at a glance

- Code reader with up to 2-megapixel sensor
- Flexible optics and filter design
- Integrated, replaceable high-power illumination
- Intuitive user interface, with flexible result string with code analysis options
- Function buttons, aiming laser, acoustic feedback signal, and green feedback LED
- MicroSD memory card

Your benefits

- High-resolution sensor and intelligent processing ensure outstanding reading performance, even under difficult reading conditions
- Flexible optical design and high-power illumination enable small codes to be read at high speeds or in applications with a large reading distance
- Fast, straightforward commissioning thanks to the intuitive user interface; function button for rapid device setup; integrated illumination and aiming laser
- Direct results monitoring thanks to acoustic signal and colored feedback spot on the object
- Few machine downtimes in the event of faults on the production line, thanks to straightforward cloning function using microSD memory card

➜ www.sick.com/Lector63x

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

TiM7xx – at a glance

- Wide detection range: 0.05 m up to maximum 25 m
- Low power consumption (typically: 4 W)
- Immediate commissioning and configuration via USB and Ethernet
- Intelligent field evaluation and measurement data output in one device
- Rugged design suitable for industry thanks to enclosure rating up to IP67

Your benefits

- Enables new solutions for mobile applications by combining intelligent field evaluation and measurement data output.
- Reliable object detection independent of the object, even with strong ambient light
- The measurement data output enables capture of additional data about parameters such as object size, shape, etc.
- Easy integration into compact AGVs thanks to rhw small size of the sensor
- Easy commissioning with rotatable connections and accessories perfectly attuned to the sensors; only a few adjustable SOPAS software parameters are necessary for commissioning
- Improved behavior for edge hits thanks to HDDM[+]

➜ **www.sick.com/TiM7xx**

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

LOCU – at a glance

- LOCU is a range of ultra-wide band (UWB) based components from SICK for tag-based indoor localization in partially and non-automated zones in logistics and production environments
- Hardware: UWB localization tags and UWB receiving antenna
- Software: Asset Analytics

Your benefits

- The compact LOCU tags provide a means of locating and tracing a wide variety of assets, for example vehicles, pallets, production materials, and other goods in a production and logistics environment
- The tags can be operated with a battery, rechargeable battery, or an external voltage supply and are suitable for all kinds of applications in harsh environments thanks to their rugged housing.
- The rugged UWB receiver antennas can be quickly and versatily mounted on ceilings and walls both on the inside and outside of buildings
- Since the receiver antennas are supplied with power via "Power over Ethernet" (PoE), the expense of laying power cables is avoided
- Asset Analytics provides a comprehensive range of tools for visualizing, combining, and evaluating the recorded position and status data.

DYNAMIC AND FLEXIBLE PRODUCTION

Flexibility and productivity working in harmony

Batch size 1 is a mechanical engineering challenge. Low quantities and individualized mass products are the key concepts of Industry 4.0. To achieve the goals associated with this, a machine or plant must be able to handle variable product infeeds and adapt to different formats. This is the only way to ensure that goods can be produced individually to suit customer needs right down to batch size 1, or be adapted to suit fluctuations in demand as flexibly and efficiently as possible. Intelligent sensor technology goes hand in hand with a new standard of quality in flexibility. It provides real time data from production. SICK sensors support and relieve data processing tasks by using intelligent functions to evaluate measurement data, and transfer the relevant user data in the form of prepared information.

Flexible production in the starting blocks

As the level of automation in a plant increases, the tasks of the individual components increase as well: Photoelectric sensors with flexible sensor settings and diagnostic functions, for example, are already used in applications across a range of industries. Inductive, IO-Link-enabled proximity sensors perform complex tasks directly in the sensor.

Contrast sensors, level sensors, and electronic pressure switches communicate parameter settings via integrated IO-Link interfaces. Measuring automation light grids reduce the amount of cabling in production environments and enable access to diagnostic functions and format changes. Encoders with EtherNet/IP™ feature an active web server as well as function blocks for fieldbus integration. Compact 2D LiDAR sensors (2D laser scanners) reliably detect objects in the field of surface monitoring.

Application specialists use this product range to develop tailored concepts for optimizing production processes with the help of SICK AppSpace. SICK is furthering Industry 4.0 in every field.

Achieving batch size 1, the ultimate in dynamic and flexible production, requires a high level of sensor support. SICK, with its huge portfolio of sensors, provides the foundation for successfully meeting this challenge.
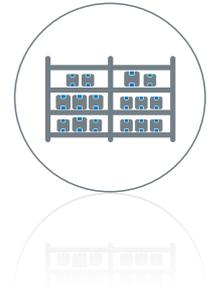
SICK AppSpace – giving space to your ideas and solutions

By networking all participating devices and establishing a secure, decentralized data exchange, it is possible to implement a wide variety of applications. These can be provided either via the cloud, or via programmable logic controllers at the machine and system level. For this purpose, SICK has developed the SICK AppSpace eco-system: A platform on which developers can exchange information and create apps for SICK sensors.

Batch size 1 turns customer's dreams into reality

SICK AppStudio – at a glance

- AppExplorer for displaying and managing SensorApp components
- Graphical Flow Editor for block programming
- AppMonitor for visualizing system performance and usage
- ViewBuilder for creating web GUIs
- Debugger with visualization of 2D and 3D images
- Recording and playback of data streams

Your benefits

- Editor with auto-completion function for program creation
- Application-specific configuration of AppTemplates via Configurator view without programming knowledge
- Emulator function for programming SensorApps without connected programmable device
- Debugging function for quick troubleshooting
- CPU and memory usage display on connected devices
- Quick integration and creation of SensorApps thanks to example programs
- Parallel connection of several programmable devices
- Validation option for assignment of SensorApps to the appropriate programmable device

➜ www.sick.com/SICK_AppStudio

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.
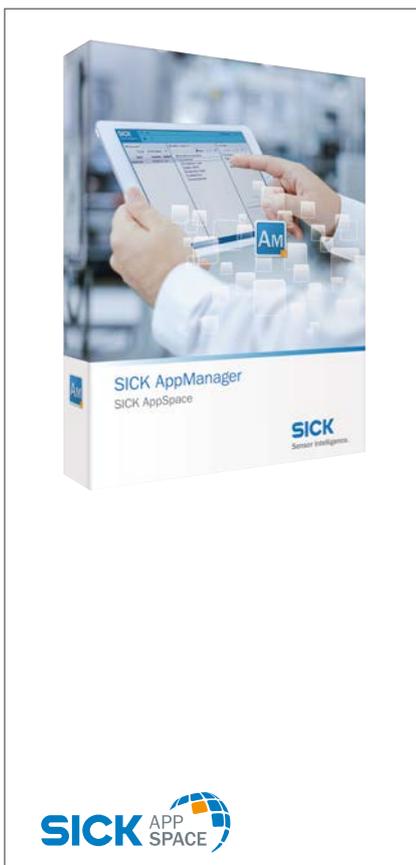
SICK AppManager – at a glance

- Clear display of connected devices as well as available apps and firmware packages
- Sensor app downloads from the SICK AppPool
- Parallel installation on several devices
- Creation and management of device back-ups

Your benefits

- A clear display and easy operation facilitate the installation of SensorApps on programmable SICK devices in the field as well as app management
- Connection to the SICK AppPool enables worldwide availability of SensorApps
- Software package validation guarantees the correct assignment of SensorApps to the appropriate programmable device in the field
- Execution of firmware updates on SICK devices and creation and management of device back-ups without additional software

➜ www.sick.com/SICK_AppManager

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

SIM2500 – at a glance

- Programmable Sensor Integration Machine for multiple camera and sensor data acquisition and merging
- 16 interfaces for the connection and voltage supply of SICK sensors via Ethernet, IO-Link, serial interface, or CAN bus

- Parallel "dual talk" via fieldbus and Ethernet interfaces for transmitting preprocessed data (edge computing) for control and cloud computing in the context of Industry 4.0
- Precise synchronization of input and output signals
- Web-based, customizable user interface
- IP65 enclosure rating

Your benefits

- Tailored application development using SICK AppSpace
- High-performance, innovative application solutions through merging of sensor data
- Recording, evaluation, and archiving of data from multiple sensors, enabling quality control, process analysis, and predictive maintenance for vertical integration in Industry 4.0

- Quick and flexible sensor integration thanks to the out-of-the-box functions of the SICK Algorithm API and Interface API
- Less development work required as sensor apps can be readily reused within SICK AppSpace devices
- Quick and easy commissioning thanks to prefabricated cables with M12 connections

InspectorP65x – at a glance

- Programmable 2D cameras (2.1 and 4.2 megapixels)
- Flexible C-mount lenses and integrated illumination
- *4Dpro* interfaces
- Aiming laser, beeper and feedback spot

- Powered by the HALCON 12 image processing software
- Scripted in SICK AppStudio
- Web-based user interface

Your benefits

- SICK AppSpace development framework offers full software flexibility for tailored solutions
- Includes a runtime license for HALCON 12, the world's leading software for industrial image processing
- The quickly programmable, high-resolution 2D cameras guarantee optimum performance

- Flexible optical design and high-power lighting enable long-distance and large FOV setups
- Unique operator interaction possibilities thanks to powerful set of convenience features
- Smooth commissioning with customized operator interface and SICK AppManager

→ www.sick.com/InspectorP65x

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

AUTOMATION OF QUALITY ASSURANCE

Quality assurance is the prerequisite for sustainable business operations and stable profits. It encompasses both material management as well as operational checks and machine and production monitoring. This makes it possible to reduce stock levels and shorten throughput times. Sensor solutions for process monitoring and quality assurance provide added flexibility and autonomous adaptation in the case of changes to quality and products. As a result, they offer resource efficiency, a lower reject rate, and a high level of throughput.

In industrial environments, capturing reality safely and reliably requires much more than just a single vision. That's why

SICK offers a broad spectrum of vision sensors, from compact devices that are easy to integrate, to configurable standalone solutions, and right through to programmable high-speed cameras for the most demanding of requirements.

Using both established SICK modules, and integration-ready functions from various image processing libraries, it is possible to create new solutions that provide the perfect match for customers' requirements and are compatible with tasks in the context of Industry 4.0. Such tasks include quality control, track and trace, object data capture, and predictive maintenance, for example.

SICK offers visionary products. Take for example our image-based quality assurance solutions for monitoring functions and machines, or our predictive maintenance and object data acquisition functionality, to name but a few.
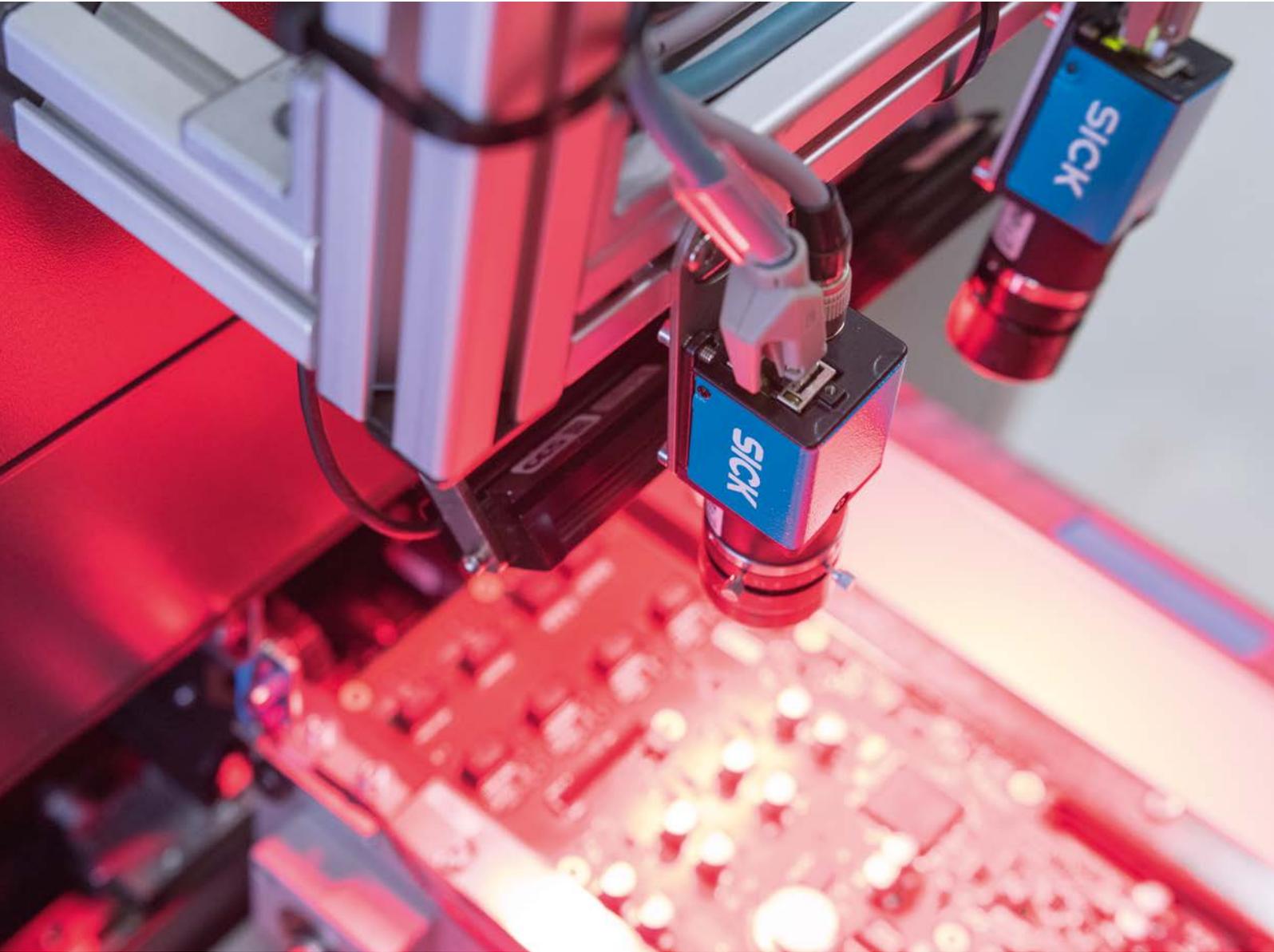
The future firmly in view

Ranger3 – at a glance

- CMOS sensor from SICK with ROCC technology for superior 3D performance
- Processing of up to 15.4 gigapixels/s.
- Full-format 3D profile at 7 kHz
- Sensor resolution: 2,560 x 832 px
- GigE Vision and GenICam compliant

- 3D, reflective, and scattered light measurement in one device
- Industrial housing, optional IP65/67 enclosure rating

Your benefits

- The unique CMOS sensor allows a higher throughput thanks to fast 3D measurements
- Reliable and precise measurements on dark and light surfaces supports production flexibility and the implementation of Industry 4.0
- High light sensitivity enables 3D inspection without the need for a powerful laser

- The precise shape, volume and position measurements for a wide variety of objects help ensure a higher product quality
- Software integration based on the GigE Vision and GenICam standards
- Simple mechanical integration thanks to the compact housing, Pro-Flex front, industrial plug connectors, and 4D*pro* accessories

➔ www.sick.com/Ranger3

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

SIM4x00 – at a glance

- Wide range of connections with 25 interfaces for Ethernet-based fieldbuses, cameras, illumination, sensors, encoders, and more
- 8-gigabit Ethernet interfaces for rapid image transmission
- Fieldbus and Ethernet interfaces with communication protocols such as OPC-UA and MQTT provide

preprocessed data (edge computing) for control and cloud computing in parallel "dual talk", thereby allowing networking for digital factories
- Precise synchronization of input and output signals
- Illumination control and supply
- IO-Link master connections
- IP65 enclosure rating

Your benefits

- Tailored application development with SICK AppSpace
- High-performance, innovative application solutions through merging of sensor and camera data
- The integrated HALCON library and the SICK API algorithm opens up a whole host of image processing possibilities for every industrial field of application
- Recording, evaluation, and archiving

of data from multiple cameras and sensors, enabling quality control, process analysis, and predictive maintenance for vertical integration in Industry 4.0
- Real-time-capable hardware reduces integration work in, for example, time-critical robotics applications
- Quick and easy commissioning thanks to prefabricated cables with M12 connections

➔ www.sick.com/SIM4x00

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

TriSpector1000 – at a glance

- 3D inspection of moving parts
- Intuitive human machine interface
- Embedded image analysis
- Easy replacement concept
- High resolution 3D image with intensity overlay
- Factory calibrated 3D data, true mm values in all dimensions
- Rugged IP67 metal housing

Your benefits

- Reliable 3D inspection even when the color, position and height of the parts vary
- Easy commissioning and operation thanks to an intuitive user interface
- Integrated image analysis for fast configuration
- Quick device replacement thanks to guaranteed field of view and re-use of saved settings
- Intensity data improves 3D navigation and allows the system to check for the presence of labels, printed patterns, or object rotation
- Factory calibrated data simplifies setup and reduces time and effort
- Withstands the harsh environments and harsh conditions in the food industry

➔ www.sick.com/TriSpector1000

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

InspectorP63x – at a glance

- Programmable 2D cameras (1.3 and 1.9 megapixels)
- Flexible S- and C-mount lenses and integrated lighting
- *4Dpro* interfaces
- Aiming laser, beeper and feedback spot
- Powered by the HALCON 12 image processing software
- Scripted in SICK AppStudio
- Web-based user interface

Your benefits

- SICK AppSpace development framework offers full software flexibility for tailored solutions
- Includes a runtime license for HALCON 12, the world's leading software for industrial image processing
- The quickly programmable, high-resolution 2D cameras guarantee optimum performance
- Flexible optical design enables analysis of small features at high speeds
- Unique operator interaction possibilities thanks to powerful set of convenience features
- Smooth commissioning with customized operator interface and SICK AppManager

➔ www.sick.com/InspectorP63x

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

MOBILE PLATFORMS

Industry 4.0 makes us mobile: Using customized sensor and navigation systems, automated guided vehicle systems in the intralogistics of a factory are succeeding in breaking down production barriers and greatly increasing the flexibility of processes.

Modular sensor solutions for mobile platforms

Automated guided vehicles and automated guided vehicle systems are now used in almost all areas of industry, for example as production supply solutions, as transport platforms on assembly lines, and as an integral part of warehouse logistics systems. The number of technical options available with AGVs as well as the resulting mobile platform applications have increased significantly over recent years. AGVS are enormously important for providing flexible, economical, and future-proof solutions. Because of the wide variety of different purposes the sensor solutions are used for, they need to be scalable and modular in order to make the transport of goods safer, faster, and more transparent. This allows risks and the causes of faults to be systematically eliminated. It also means that a number of different stages in the production process can be accelerated.

SICK's portfolio ranges from sensor solutions for automated guided carts (AGCs) right through to specialized automated guided vehicles (AGVs).

And we are constantly further developing our products in this area. The new outdoorScan3 also makes it possible to move carts/vehicles between factory buildings without a driver, regardless of the weather conditions.

Collision-free colleagues

Cost-effective automated guided carts must run through production paths, which can be very narrow at times, without posing a risk to persons, machines, and transport goods. Sensor and system solutions from SICK help to reliably protect humans and property from collisions, while at the same time collecting all necessary data for the dependable and flexible navigation of automated guided carts. AGCs manage high speeds even when going around curves thanks to the switching of protective fields. Reliable detection of speed and direction of travel with safety solutions from SICK also reduces the number of components, and thereby the required installation space in AGCs.

Collision-free, precision-guided assistance

Glossary

- AGV: automated guided vehicle
- AGC: automated guided cart
- AGV system/AGVS: automated guided vehicle system
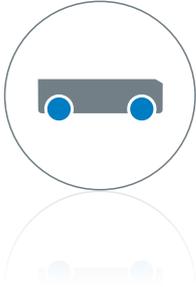
Automated material transport that makes great sense

OLS – at a glance

- Detection of luminescent adhesive tape
- Very high signal-to-noise ratio (~1:1,000)
- 180 mm reading field (up to 3 lanes can be read at the same time)
- Output of deviation from lane center point and reading out of bar codes
- Insensitive to ambient light, contamination or glare
- Compensation for surface defects
- Measurement accuracy: ± 1 mm
- CANopen and Ethernet (TCP/IP)

Your benefits

- Rugged and accurate, insensitive to ambient light, contamination or surface defects
- Independent of base material or color
- Simple lane shifts and route changes by attaching conventional adhesive tape
- Small curve radii of up to 0.5 m possible
- Large reading field enables flexible lane shifts (branches, junctions)
- Reading bar codes makes it possible to transmit distance information or drive commands and simplifies vehicle control
- Cost efficient compared to camera solutions
- Low installation costs

➔ www.sick.com/OLS

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

MLS – at a glance

- Detection of magnetic lines for line guidance
- Detection of switches: up to 3 lanes at a time
- Resolution 1 mm, repeatability 1 mm
- CANopen interface
- Detection of control marks
- IP65, IP67, IP68
- Ambient temperature –20 °C … +70 °C
- Variants with measuring ranges of 100 mm to 1,000 mm

Your benefits

- Rugged aluminum housing
- Easy installation: Thin housing design and different measurement area variants
- Quick commissioning without configuration. Optional configuration and visualization via a user interface.
- Large ground clearance: 10 mm to 50 mm of distance to the magnetic band can be installed
- Reliable lane detection and differentiation of up to 3 lanes for intersections and lane junctions
- Monitoring of magnetic strength of the guidance lane
- Easy and reliable detection of command marks (STOP, MERGE, SPEED CHANGE)
- Complete accessories available: Magnetic band for lanes and markers, mounting bracket

➔ www.sick.com/MLS

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

Functional app for SICK sensors
contour localization in changing environments – at a glance

- Precise localization on the basis of the existing environment
- Automatically adapts to changes in the environment

- Supports many SICK laser scanners

Your benefits

- Quick and easy commissioning
- Installation of reflectors and other additional infrastructure not necessary
- The app begins by creating a high-precision map of the surrounding area

- Easy configuration and visualization in the browser

outdoorScan3 – at a glance

- Certified in accordance with ISO 13849 and IEC 62998 for indoor and outdoor use
- safeHDDM® scanning technology for outdoors
- Individual field settings

- Optimized product design for outdoor use
- Protective field range: 4 m
- Up to 128 freely configurable fields
- Safe networking with Flexi Soft safety controller

Your benefits

- High productivity due to safe human-machine cooperation outdoors areas
- Outstanding availability even under unfavorable weather conditions
- Flexibility for safe, customized automation processes
- User-friendly and suitable for outdoor use

- Easy access to diagnostic data
- Precise localization due to highly precise measurement data
- Continuous material flow due to intralogistics processes beyond the limits of the factory

➔ **www.sick.com/outdoorScan3**

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

HUMAN-MACHINE COLLABORATION

In connected factories, humans and machines are brought into even closer proximity. In the spirit of a modern division of labor, SICK sensors are offering robots a helping hand and providing them with a "set of eyes" for accomplishing their tasks in the industrial environment. This closer interaction between humans and machines calls for safety solutions that can respond with absolute reliability and a high level of flexibility.

The aim is to turn cooperation and coexistence into true collaboration. Instead of autonomous or semi-autonomous robotics, the connected factory of tomorrow places great store on a close interaction between robots and humans. In these so-called collaborative scenarios, the force, speed, and paths of the robot and workpiece pose a risk to workers. These risks must be minimized either by using inherent safety measures, or by employing additional measures. SICK has made significant advances in this area in recent years.

Hand in hand – with no fear of contact
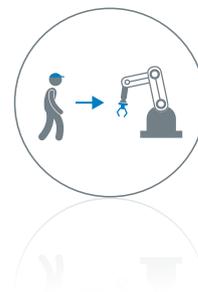
Flexible safety

It is already possible to adapt safety sensors well to the current machine process. Intelligent algorithms are making it possible, for example, to move away from digitally activated safety technology in favor of a continuous machine response based on the current position of the worker or the plant. This means that the worker approaching the machine no longer triggers a complete shutdown, but rather an appropriate reduction in the speed of the machine, or adjustments to the directions of movement of the machine, thereby ensuring the safety of persons at all times and allowing production to continue uninterrupted. This results in significantly fewer downtimes and unintended shutdowns, shorter cycle times, and an increase in the efficiency and availability of the machines and plants.

**Functional safety in
human-robot collaboration (HRC)**

A high level of automation versus flexible production workflows: where people and machines now have to work more closely and also more safely together, functional safety will take today's production systems an important step closer to greater flexibility. If the ultimate goal is complete collaboration – where humans and robots share the same workspace and concurrently carrying out their work there – then it makes sense to develop solutions that also enable coexistence and cooperation. With more than 70 years of experience and knowledge to draw upon, SICK has assembled a huge portfolio of safety solutions in its product range.

Safety expertise in the portfolio

The programmable safety controller with accompanying software, which can also be combined with a safe series connection, makes it possible to protect a large number of hazardous points at the same time. The new generation of safety laser scanners reliably protects hazardous areas, access points, and hazardous points. High-performance safety light curtains are suitable for use as compact muting alternatives that do not require any additional sensors, as well as for providing high-availability hazardous point and area protection. SICK maximizes the availability of protective devices, and keeps machine and plant downtime to a minimum with its products.

microScan3 Pro – at a glance

- Innovative safeHDDM® scanning technology
- Protective field range: Up to 9 m, scanning angle: 275°
- Up to 128 freely configurable fields
- Up to 8 simultaneous protective fields
- Ethernet-based output for high-precision measurement data
- Safe machine integration with EtherNet/IP™ CIP Safety™ or PROFINET PROFIsafe
- Safe SICK device communication via EFI-pro

Your benefits

- Reliable technology and a rugged design: microScan3 Pro safety laser scanners are at home in harsh industrial environments. Even in environments with dirt, dust and ambient light, the new generation of scanners shows how extremely resistant it is - thanks to the safeHDDM® scan technology, aluminum housing and well-designed fastening concept.
- Smart integration: Low cabling costs due to standardized interfaces, fast device change due to configuration memory, and safe machine integration via networks possible
- Intuitive operation: Easy commissioning with the Safety Designer software and diagnostic options via the display, pushbuttons, or network
- Intelligent functions: Simultaneous protective fields, contour detection fields or measurement data output – with the help of the intelligent functions, the sensor settings can be optimally adjusted to the different requirements.

➜ www.sick.com/microScan3_Pro

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.
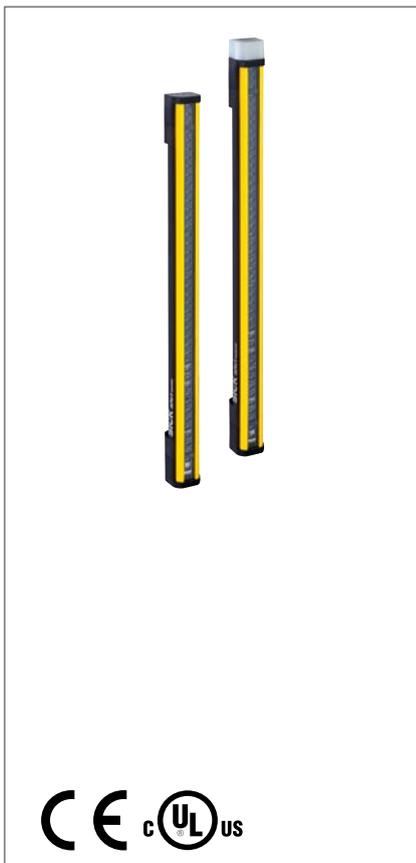
deTec – at a glance

- NFC diagnosis and smartphone app
- Diagnostics and automation via IO-Link
- 2-signal muting
- smart presence detection
- dynamic protective field widths
- Configuration of all functions without software
- Reduced resolution: 1 or 2 beams
- IP65, IP67, and IP69K enclosure ratings plus variants for explosion-hazardous areas

Your benefits

- Increased productivity and short downtimes thanks to extensive and innovative diagnostic options
- Safety and automation combined: IO-Link makes cost-effective system design possible
- Muting provides maximum productivity and safety in differentiating between people and material
- High availability: smart presence detection prevents unwanted switch-offs
- Easy commissioning and configuration without the need for software, saving time and money
- IP65, IP67, and IP69K enclosure ratings available, plus variants for explosion-hazardous areas, ensuring maximum reliability in harsh environments

➜ www.sick.com/deTec

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

Safe EFI-pro System – at a glance

- Industrial Ethernet-based, safe network technology
- Configuration via Safety Designer
- Safe integration of up to 6 safety laser scanners

- Safe integration of robot controls via Ethernet/IP™ CIP Safety™
- Safe, integrated movement monitoring
- Simultaneous monitoring of up to 48 protective fields

Your benefits

- Optimal interaction in the safety system: Optimal networking of safety sensors, safety controllers and actuators connected via Ethernet/IP™ CIP Safety™
- Fast, intuitive commissioning: Safety Designer for the configuration of SICK system components and clever connectivity

- Secure productivity: Combination of safe motion monitoring, simultaneous protection field monitoring and extended network integration
- Optimized processes: Extensive diagnostic options via Safety Designer and data via Ethernet from the field level into the cloud
- Security of investment: Future-proof industrial Ethernet technology

➔ www.sick.com/Safe_EFI-pro_System

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

Safe Robotics Area Protection – at a glance

- Safety functions thanks to readymade, tested functional logic
- Proven safety logic triggers robot safety functions

- Performance level PL d
- Automated robot restart possible

Your benefits

- Free, safe access to cooperative robot applications for high productivity, low downtimes, and optimum work processes
- High flexibility as the system is easy to adapt to the robot application and production environment
- Future-proof, as it can be flexibly expanded

- Detailed documentation for robot integration, compliant with relevant standards
- Low costs as the system is easy to integrate into common industrial robot controllers, thanks to generic or specific safety systems
- Reliable safety for your plant – proven safety logic, developed by SICK experts

➔ www.sick.com/Safe_Robotics_Area_Protection

For more information, simply enter the link or scan the QR code to get direct access to technical data, CAD design models, operating instructions, software, application examples, and much more.

DATA SOVEREIGNTY AND DATA SECURITY

Production data is a valuable asset for every company. That's why it is so important for commercial success, and why it requires special protection. SICK's products and system solutions are right at the very beginning of the networked value creation chain. When humans are taken out of the process, sensor technology becomes the only source of production data – and the reliability of this data affects the subsequent success of the networked processes.

SICK applies two essential principles to sensor data collection: Firstly, the collected data must be protected against manipulation at all times. Secondly, there must be clear definitions in place with regard to who is authorized to further process the data at subsequent stages of the value creation chain and how they do this. We refer to these principles as data sovereignty.

While data-collecting sensors are the physical prerequisite for Industry 4.0, data sovereignty is also important from a psychological point of view. After all, only companies who have full faith in the security of their network will be prepared to feed data into it.

Guaranteeing data sovereignty: A joint effort

In order to fully exploit the potential of Industry 4.0, the network of parties involved must think and act beyond the boundaries of their own production systems. If supplier, manufacturer, and customer processes are to link up seamlessly and automatically, data sovereignty is the key to success. Many companies consider cloud applications to be insufficiently developed to guarantee data security at this time. To become independent from commercial cloud suppliers and to think through data security issues on behalf of its customers, SICK co-founded the Industrial Data Spaces Association initiative.

Cybersecurity in an Industry 4.0 environment

Cybersecurity means protecting products and the data that they generate and process and ensuring their availability, integrity, and confidentiality. Cybersecurity forms the basis for our customers' trust in our products. As the digitization and networking of production plants increases so too does the risk of cyberattacks. These can originate inside or outside the production network (for example they can come from the Internet or from wireless interfaces). For this reason, a comprehensive cybersecurity strategy is essential. Transmitting data securely and protecting systems against manipulation by hackers present an increasing challenge, in particular as a result of the growth of networking in Industry 4.0 environments.

SICK's solutions therefore need to meet the highest quality standards. Our cybersecurity strategy begins even before we start developing new products and is based on the international series of standards "IEC 62443 „Industrial communication networks – Network and system security". This enables us to closely monitor the cybersecurity of our products from the outset and over the entire product life cycle.

**INTERNATIONAL DATA
SPACES** ASSOCIATION

SICK a member of the Industrial Data Spaces Association

Successful data management is the key to enabling Industry 4.0. Only with secure data can vision become a reality. In the context of Industry 4.0, this joint initiative of the Fraunhofer Society and several companies, which is supported by the German Federal Ministry of Education and Research, aims to create a secure data space within which enterprises of different industries and different sizes can autonomously manage their data assets.

4.0 NOW IS AVAILABLE TO ALL

Industry 4.0 is no longer just a vision. It is happening here and now. We are demonstrating this in our own connected 4.0 NOW factory in Freiburg. We are happy to show our customers how they too can get involved in these rapid developments, or at what point they are already at. Welcome to a fully connected world.

A view of the 4.0 NOW factory in Freiburg

4.0 NOW at SICK

SICK leads the way. In the 4.0 NOW factory in Freiburg, SICK is itself following the path to Industry 4.0 production. Here too, its intelligent sensors are providing the foundation for an autonomous value creation chain. The data gathered are further processed in the cloud and edge, and serve as the basis for the partial or full automation of the downstream production steps. With the aid of its own sensors, SICK is already producing the next generation of "Sensor Intelligence."

4.0 NOW for our customers

The demand analysis for the customer is based on the maturity model developed by acatech, the German Academy of Science and Engineering. The model comprises a number of stages and assumes that Industry 4.0 applications build on one another and are constantly evolving.

We would be delighted to accompany you on the path to Industry 4.0. Simply contact us and let our experts advise you on the first and subsequent steps towards the 4.0 NOW world of SICK.

Panel

Computerization

Connectivity

Visibility
What is happening?
Seeing

Transparency
Why is it happening?
Understanding

Predictive capacity
What is going to happen?
Being prepared

Adaptability
What autonomous responses are available?
Self-optimizing

Digitalization

Industry 4.0

Based on the acatech Industrie 4.0 Maturity Index
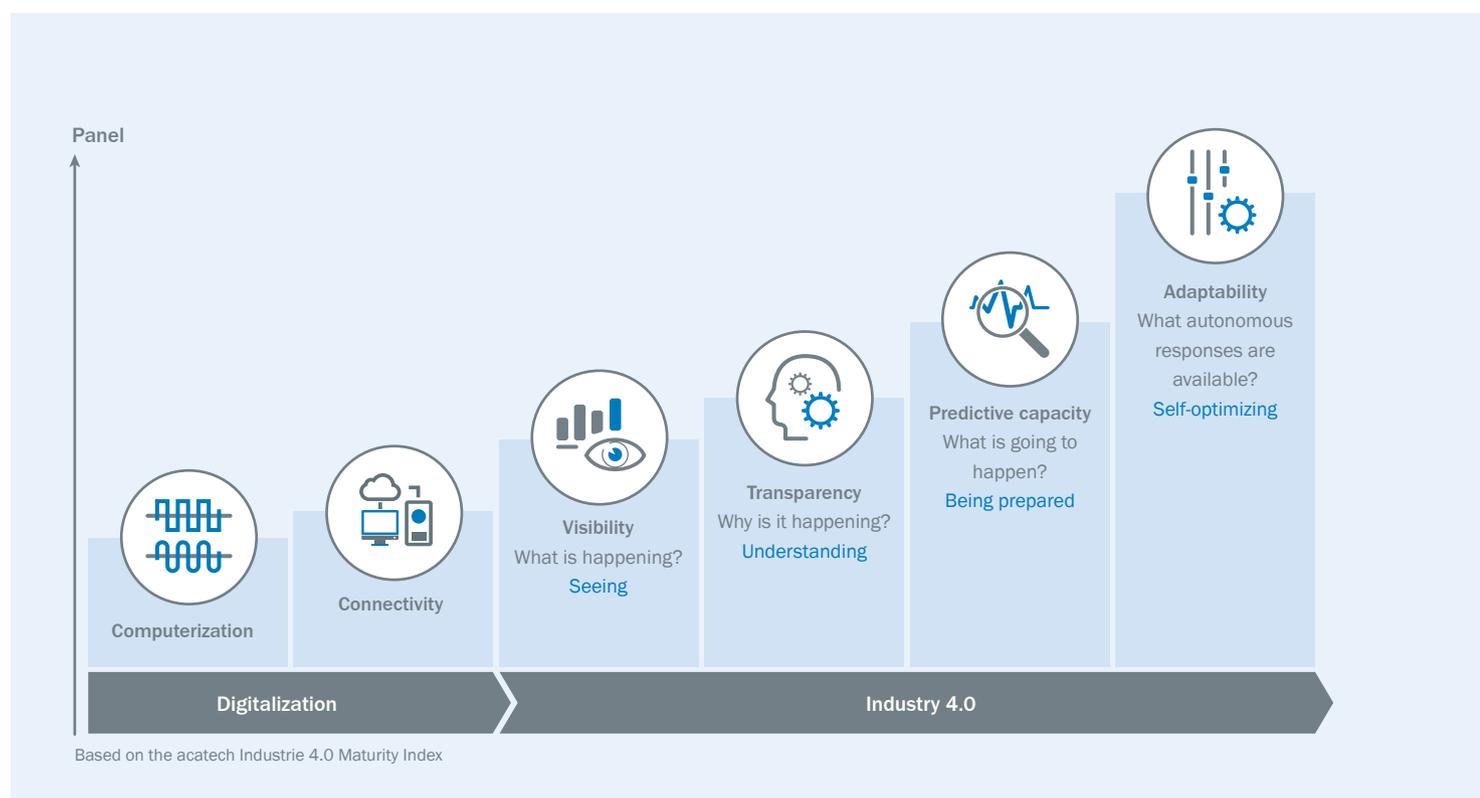
SICK AT A GLANCE

SICK is a leading manufacturer of intelligent sensors and sensor solutions for industrial applications. With more than 8,800 employees and over 50 subsidiaries and equity investments as well as numerous agencies worldwide, SICK is always close to its customers. A unique range of products and services creates the perfect basis for controlling processes securely and efficiently, protecting individuals from accidents, and preventing damage to the environment.

SICK has extensive experience in various industries and understands their processes and requirements. With intelligent sensors, SICK delivers exactly what the customers need. In application centers in Europe, Asia, and North America, system solutions are tested and optimized in accordance with customer specifications. All this makes SICK a reliable supplier and development partner.

Comprehensive services round out the offering: SICK LifeTime Services provide support throughout the machine life cycle and ensure safety and productivity.

That is "Sensor Intelligence."

Worldwide presence:

Australia, Austria, Belgium, Brazil, Canada, Chile, China, Czech Republic, Denmark, Finland, France, Germany, Great Britain, Hungary, Hong Kong, India, Israel, Italy, Japan, Malaysia, Mexico, Netherlands, New Zealand, Norway, Poland, Romania, Russia, Singapore, Slovakia, Slovenia, South Africa, South Korea, Spain, Sweden, Switzerland, Taiwan, Thailand, Turkey, United Arab Emirates, USA, Vietnam.

Detailed addresses and further locations ➔ **www.sick.com**

SICK
Sensor Intelligence.

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